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Marine Corps Air Ground Combat Center (MCAGCC) Land Management System (LMS) Military Field Application Site FY00 In-Progress Review

by Heidi R. Howard, Dick Gebhart, and William Goran

November 2000



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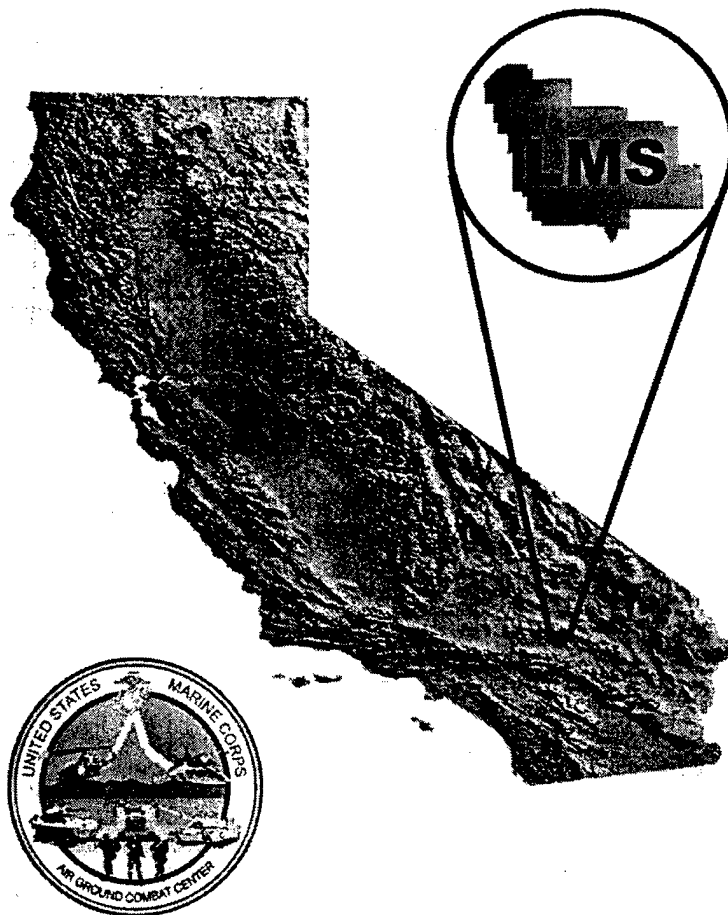
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by Heidi R. Howard, Dick Gebhart, and William Goran

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Foreword

This study was conducted for the U.S. Army Corps of Engineers Research and Development Directorate, which established the Land Management System (LMS) Special Project Office in March 1997. The proponents are Dr. Lewis E. Link, Director of Research and Development for the U.S. Army Corps of Engineers (CERD-Z), and Dr. Donald Leverenz, Deputy Director of CERD.

The work was performed by the Land and Heritage Conservation Branch (CN-C) of the Installations Division (CN), Construction Engineering Research Laboratory (CERL). The CERL Principal Investigator was Dick Gebhart. Part of this work was done by Heidi Howard, CERL. The technical editor was Gloria J. Wienke, Information Technology Laboratory. Robert E. Riggins is Chief, CEERD-CN-C and Dr. John T. Bandy is Chief, CEERD-CN. The associated Technical Director was Dr. William D. Severinghaus, CEERD-TD. The Acting Director of CERL is William D. Goran.

CERL is an element of the U.S. Army Engineer Research and Development Center (ERDC), U.S. Army Corps of Engineers. The Director of ERDC is Dr. James R. Houston and the Commander is COL James S. Weller, EN.

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1 Introduction

Background

The Land Management System

The Land Management System (LMS) is an initiative of the U.S. Army Corps of Engineers (USACE) Engineer Research and Development Center (ERDC) focused on improving landscape analysis and landscape management capabilities in several of the Corps of Engineers major mission areas. These mission areas include the U.S. Army Civil Works Programs (navigation, flood control, water supply and quality, recreation, etc.), military installations operations and management (specifically military land management), and military engineering and terrain related operations (trafficability analysis, military hydrology, littoral operations, line of sight analysis, etc.).

The purpose of LMS is to provide relevant science, tools, and information to land and water resource managers and decisionmakers with the goal of enhancing their ability to understand and communicate past, current, and potential impacts of management actions on land and water resources. LMS was established, in part, to improve synergism in technology development across each of these mission areas, to improve USACE'S and the Department of Defense's (DoD's) ability to represent landscape processes and features, and forecast future landscape conditions, based upon alternative scenarios.

The LMS initiative had its roots in a study initiated in autumn 1995 related to modeling and simulation capabilities developed or used by the Corps of Engineers, related to landscape or geoprocesses. After this study, the Director of Research and Development, in consultation with the ERDC laboratory directors and others, decided to establish the LMS initiative.

To accomplish the goals of LMS, a Special Project Office for LMS was established, with representatives from most of the ERDC Laboratories, the Hydrologic Engineering Center of the Water Resources Support Center, and several Corps of Engineer Districts. The project director, associate directors, and the various organizational representatives comprise the LMS Development Team. Researchers throughout the ERDC laboratories (and their partners) form work teams to

perform specific tasks associated with LMS; these efforts are dovetailed into numerous existing technology programs.

Plans for the LMS Initiative are available (and updated) on the LMS website (<http://www.denix.osd.mil/LMS>) under the Defense Environmental Network Information eXchange (DENIX). For more information please see the ERDC/CERL Technical Report 99/60, *Plans for the Land Management System (LMS) Initiative* on the LMS website.

The LMS Field Application Program

The LMS Field Application Program has four major purposes:

1. To provide problem-solving and partnering relations between the Corps of Engineers scientists, technology developers, and interested and innovative landscape/natural resource managers in USACE's major mission areas.
2. To provide site-specific and problem-specific input into the design of LMS2000 functional capabilities.
3. To provide technology test environments where scientists, technology developers, and resource managers/analysts together can tackle issues, test solutions, adjust approaches, capture costs and benefits, and "demonstrate" the results to interested parties.
4. To provide a framework for planning the transfer of LMS technology to land/water resource managers, both at the sites for demonstrations and other similar sites.

Field application sites were selected based on the following criteria:

1. Interest from land/water resource managers in infusing new capabilities into their business practices, and developing collaborative partnerships with scientists and technology providers.
2. Representative land/water resources management issues — such as high levels of use, sensitive resources, competing multiple uses and stakeholders, and other problems and issues identified by user groups as important.
3. Importance of the site or problem set to the mission.

4. Support and concurrence for LMS Field Applications not only at the local level, but also from across the organizational management.
5. Synergism with existing programs/efforts.

The original sites selected for field applications were Fort Hood, TX, and in three locations in the Upper Mississippi River Basin: (1) Redwood Basin, along the Minnesota River in Southern Minnesota, (2) Pool 8 on the Mississippi River near LaCrosse, WI, and (3) Peoria Lakes, on the Illinois River at Peoria, IL. In 1999, the Marine Corps Air Ground Combat Center at Twentynine Palms, CA, was officially designated as a field application site. Currently, Fort Benning, GA, is being considered as an additional field application site.

Dr. John Barko serves as the LMS Field Application Program Director. In addition, there is a Field Application Site Coordinator for each site. Dr. Dick Gebhart serves in this capacity for the MCAGCC site. MCAGCC has one user point of contact (POC), Mr. Kip Otis-Diehl from the Natural Resources and Environmental Affairs Directorate at MCAGCC.

The MCAGCC Military Field Application Site

MCAGCC is composed of 596,480 acres (932 square miles [2414 sq km]) within the heart of the Mojave Desert, 40 miles (64 km) north of Palm Springs, CA. It was established in 1952. The desert terrain and arid climate offer prime training conditions to carry out MCAGCC's mission. The primary mission is to develop, administer, and evaluate the Marine Corps' Combined Arms Exercise (CAX) training. Annually 50,000 to 60,000 soldiers are processed through the CAX program. An additional 8,000 Marines are trained in electronic fundamentals, operational communications, air control/anti-air warfare operations, and communication/electronic maintenance at the Marine Corps Communication-Electronics School (MCESS) at MCAGCC.

The topography and climate at MCAGCC present unique natural resource management issues. The fragile desert ecosystem is highly susceptible to impacts that in most areas are normally insignificant. The repair of these impacts through natural processes may take thousands of years. Land managers are responsible for ensuring the sustainable usefulness of training areas by minimizing impacts on plant communities, soils, water, and animal communities, and through monitoring of training impacts. Land managers need accessible tools for monitoring and predicting these impacts. Monitoring and predicting impacts on training lands will ensure safe and effective training lands for both troops and the Mojave Desert ecosystem.

LMS Field Application Program Transitions

The field application program for LMS both shapes the development of new LMS capabilities and tests these capabilities to help solve management and landscape analysis problems in the field. The field application efforts provide opportunities to test, evaluate, modify, and document how LMS capabilities help to address specific user problems and how LMS results and capabilities fit into decision processes at user sites.

Field Application Site In-Progress Reviews (IPRs) are designed to ensure that the stages of evaluation, modification, and documentation are fulfilled. These reviews also allow other interested parties to look over the shoulders of those involved at the host site and evaluate the value of applying LMS investments and results at other sites.

Preliminary contact with MCAGCC was initiated in September of 1998, followed by a letter of invitation to serve as a field application site in January of 1999. The initial LMS Needs Assessment workshop was held at MCAGCC during February of 1999 to identify and prioritize land/water resource management issues at the site. A plan was then developed and projects initiated to address these plans. This report documents the IPR, user recommendations, and post-IPR follow-up actions.

Objectives

The objectives of this IPR were to provide a forum where personnel involved with specific MCAGCC Land Management System Military Field Application projects could discuss the progress of each effort, identify the relationships between projects, and solicit input from potential users of the resulting products.

Approach

The first IPR workshop was held 13 April 2000, at the Holiday Inn - Palm Mountain Resort in Palm Springs, CA. The IPR consisted of presentations on LMS and individual projects. Following project presentations, inputs from installation personnel and others present were obtained. Prior to the meeting closure, user input was discussed and actions were defined to address each issue. Results of the IPR are documented in this report to ensure project improvements and adjustments occur and to assist with the next IPR.

Scope

The MCAGCC LMS Military Field Application IPR only addresses projects associated with the MCAGCC LMS Military Field Application. This report does not attempt to address projects and issues associated with other military and civil works LMS field applications.

Mode of Technology Transfer

This report documents the presentations and discussions of the MCAGCC LMS Military Field Application IPR. Technical concerns and unresolved issues associated with individual projects are being addressed by the project investigators on an individual project basis.

2 Agenda for the FY00 MCAGCC LMS Military Field Application Site IPR

The agenda for the MCAGCC LMS Military Demonstration FY00 IPR is provided below.

Wednesday, 13 April 2000

- | | |
|-------------|--|
| 8:15-8:45 | Overall LMS Introduction: Bill Goran |
| 8:45-9:15 | MCAGCC Introduction: Dick Gebhart
Inter-connection of projects and user requirements |
| 9:15-10:15 | Web-based Map Dissemination and
Data Enterprise Repository Design and Test: Kelly Dilks |
| 10:15-10:30 | Break |
| 10:30-11:30 | Wind Erosion: Ed Skidmore |
| 11:30-12:00 | LCTA/ITAM at MCAGCC: Liz Kellogg |
| 12:00-13:00 | Lunch Break |
| 13:00-13:30 | SERDP Remote Sensing: Paul Tueller |
| 13:30-15:00 | Carrying Capacity: David Price, Terry McLendon,
and Mike Childress |
| 15:00-15:15 | Break |
| 15:15-16:00 | Comment and Review
Feedback from MCAGCC POCs |
| 16:00-16:45 | Input from other participating organizations |
| 16:45-17:00 | Closing remarks, IPR conclusion. |

3 MCAGCC LMS Military Field Application Site IPR Attendees

The following individuals attended the FY00 MCAGCC LMS Military Field Application Site IPR.

NAME	ORGANIZATION
Lorrie Agnew	MCAGCC
Mike Childress	Shepherd Miller, Inc.
Kelly Dilks	ERDC/CERL
Clarence Everly	Mojave Desert Eco. Program
Jeff Foisy	Mojave Desert Eco. Program
Tom Frank	University of Illinois
Dick Gebhart	ERDC/CERL
Bill Goran	ERDC/CERL
Heidi Howard	ERDC/CERL
Liz Kellogg	Tierra Data Systems
Richard Lawrence	ESRI
Dawn Lawson	Naval Facilities Eng.
Terry McLendon	Shepherd Miller, Inc.
Kip Otis-Diehl	MCAGCC
Val Prehoda	MCAGCC
David Price	ERDC/CERL
Doug Ramsey	Utah State University
Ed Skidmore	USDA-ARS
Ruth Sparks	Fort Irwin
Paul Tueller	University of Nevada Reno
Scott Tweddale	ERDC/CERL
Robert Washington-Allen	Oakridge National Laboratories

4 MCAGCC LMS Military Field Application Site IPR Project Presentations

The following pages provide briefing materials presented at the MCAGCC LMS Military Field Application Site IPR. Each section provides the presenter's name and the presentation materials.

PRESENTATION: The Land Management System.

PRESENTER: William Goran.





Business Approach

- Create Special Project Office (Goran, Barko, Holland)
- Build Team from Across ERDC and Corps of Engineers and Build Partnerships with other Agencies
- Develop standard practices across the partnership
- Create Resources by Horizontal Planning Across Programs, not Separate Program
- Establish Network of Field Application Sites to Involve End Users in Building LMS Capabilities

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Technical Approach



Create Catalog of computational tools

Develop rules/protocols for interactions between tools in LMS



LMS 2000: Build Integrating framework for land management tools



Test Projects at Network of Field Applications Sites

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Status

- Published Plans Document (June 1999)
- Established Public Website (May 1999)
- Completing Version 2.0 of Tool Catalog (CERL lead, HEC, CHL, EL, CRREL Testbed)
- Established Protocol Testbeds for Level II and III (CRREL lead, ITL, CHL, EL, CERL, Rock Island Participants)
- Established Five Field Application Sites (CERL and EL lead)
- Built Initial LMS 2000 Framework (CHL & ITL leads)
- Established Academic, Industry and Agency Partnerships (Through Contracts, MOA, etc)

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LMS Partnerships (Academic and Industry)

Through 5 Year Tasking Contract

University of Illinois (ESRI, Menzie-Cura,
Environmental Resources)

Kansas State (Intergraph Corp, Aqua-Terr, LLC)

Pacific Meridian

Shepherd-Miller

Tetra Tech (ESRI, U of I GMS Lab, Univ. of
Mississippi Field Station (UMFS), University of
Virginia)

Through Congressional Initiative

Sam Houston State University

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LMS Partnerships (Agencies and Organizations)

Through Collaborative and Partnering
Arrangements

Inter-Agency Group for Decision Support

Open GIS Consortium

CADD/GIS Center

SERDP

Army Research Office

DOE Labs

EPA Labs

ARS/NRCS

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LMS Functional Levels

Provides

- Query archived data
- Modify/execute models
- Visualization Capabilities
- Remote and local access
- Provide collaborative tools
- State-of-the-art modeling systems
- Model calibration/verification
- Uncertainty analysis tools
- Model capabilities catalog
- Navigate to servers and download
- Archive data across the network
- Establish common data formatting
- Integrate parameter databases
- Set up user-specific problems
- Compose problem-specific models
- Develop model-to-model protocols



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LMS 2000 Deliverables

LMS Version	Date to Field	Technical Capabilities	Benefits
2000	20 Jan 00	<ul style="list-style-type: none"> - Linked watershed-receiving water flow and sediment transport modeling (e.g., combination of FWS, SWE, HMS with RUSLE, SMWE, SED2D) - Connectivity to NEXRAD weather radar, DTEDS - Indirect feedback to hydrologic runoff, sediment transport through initial coupling to plant model (e.g., EDYS, DLAMS components) - Initial network-based computational framework - First generation modeling catalog and standards 	<ul style="list-style-type: none"> - Managers (range, training area, resource) can evaluate effects of impending storms and frontal activity on training/testing and project operations, and can evaluate environmental impacts of training and project operations over short-term (days) to seasonal (months) time frames - Sets the basis for technical users to prepare for much advanced capabilities that will follow - Through partnering, sets standardized method for integrating modeling, data collection, and decisionmaking in a more holistic manner

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LMS 2001 Deliverables

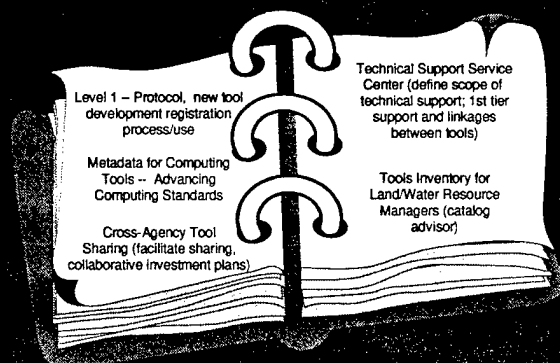
LMS Version	Date to Field	Technical Capabilities	Benefits
2001	20 Jan 01	<ul style="list-style-type: none"> - Initial LMS modeling suite with screening-level tools - Standards for linking models in LMS modeling suite - Seamless connectivity to major GIS (e.g., ArcInfo, MGE, etc.) and meteorological and environmental databases in both local and network modes - Improved training footprint impact simulation - System output formatted for direct input to user decision support systems (e.g., ATTACC, ITAM, WCDS, demo site systems) - Initial metadata standards established - Metadata requirements published and implementation initiated for LMS modeling suite - Improved model catalog with model selection criteria and guidance 	<ul style="list-style-type: none"> - Productivity enhancement through ease of access to GIS, modeling, data - Standards for linkage of future models including user-specific models and analysis work - Ability to use World Wide Web as an extension of local user's machine for access to remote databases, computing resources - Linkage of modeling and simulation output in formats directly importable to user decision support systems - Standardized methods for data characterization, assembly, and archival - Descriptors for modeling and simulation tools themselves to empower reuse and verification - Support to users in model applicability, limitations, and selection

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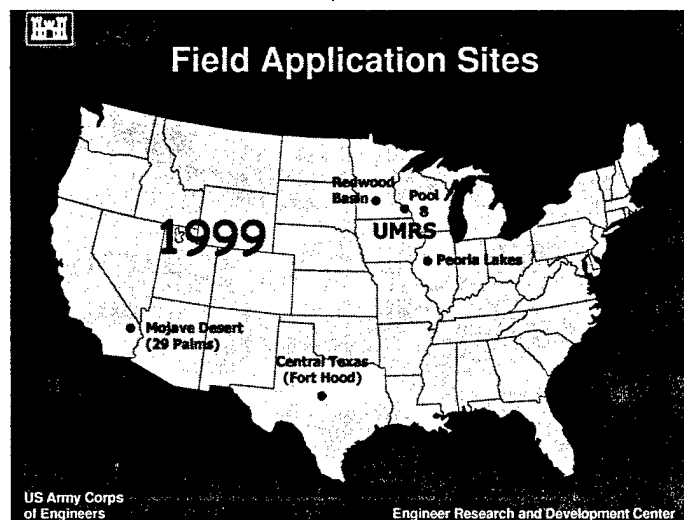
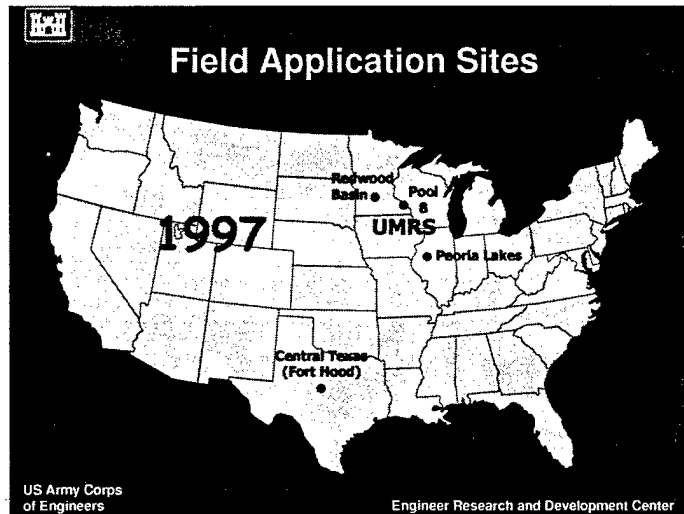
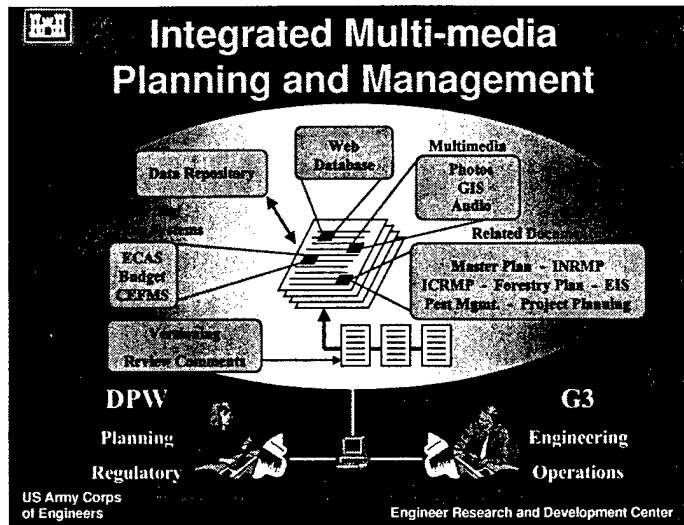


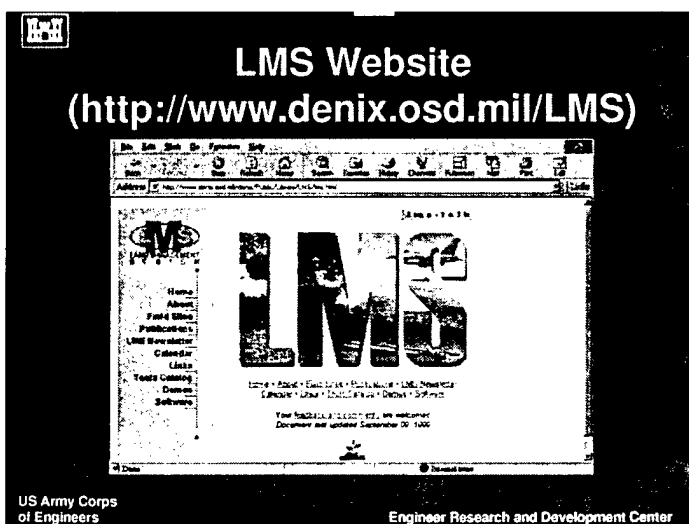
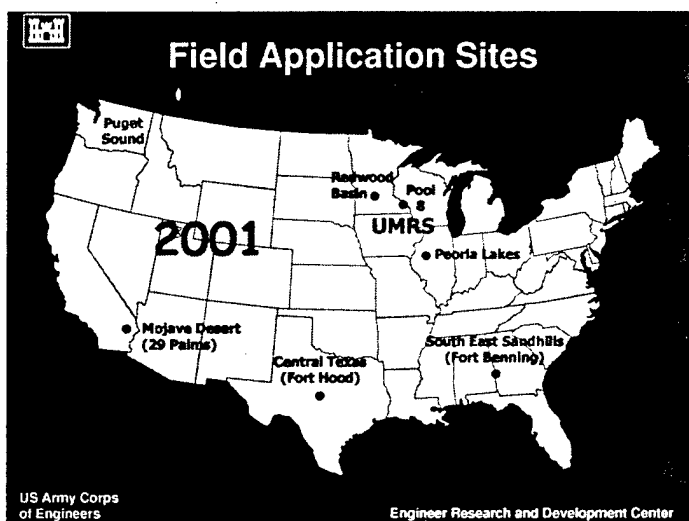
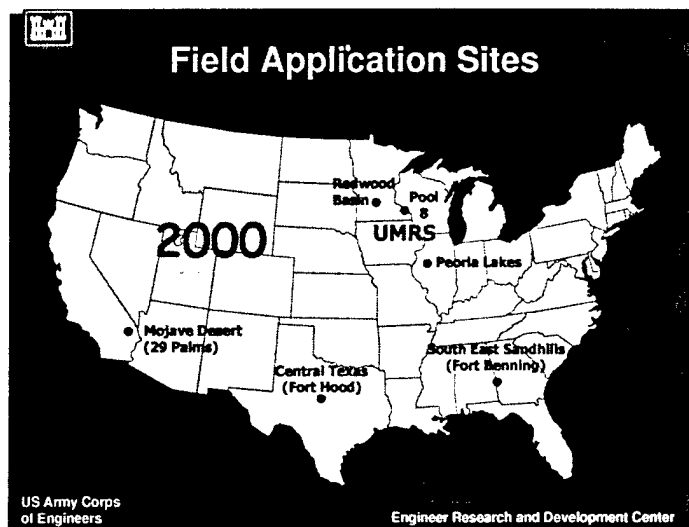
LMS Catalog



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Introduction to Demo

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LMS Design Goals

- Seamless access to distributed resources (models, data, computers)
- User-friendly graphical user interface (GUI)
- Ability to readily incorporate legacy models
- Ability to readily integrate new technologies (e.g., object-oriented models)
- Ability to readily integrate evolving protocol mechanisms
- Archiving of selected data and model output

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LMS Design Goals (cont)

- Automatic distribution of updates of models and data resources
- Access to security-controlled resources when necessary
- Maximum use of industry standards and COTS software
- Support for Windows NT/2000 and Unix client machines
- Optimal Use of Web Assets with Client Options

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LMS Technologies

Java

CORBA (Common Object Request Broker Architecture)

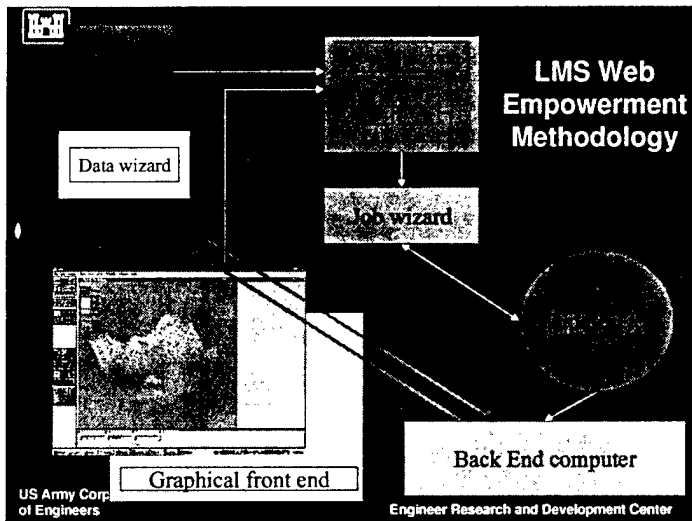
Kerberos v5 (mechanism for authenticating access to secure resources)

Webflow (middle tier server software - interim solution to be replaced by industry standard COTS software)

COTS GIS and DBMS

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Backup Slides

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Aspects of LMS Demo

- Overview of LMS Look and Feel
 - System configuration
- Web-based Features of "Manage Data" Level
- Model and Simulate Level Features
 - Example for military installation
 - Example for Army civil works project
- Capabilities of the Decision Support Level
- Near-term Fielding
- Plans for Future Capabilities

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LMS2001 Development Pathway

Field 1 Jan 2001

- More URLs to get data from websites.
- VRML, OpenGL capabilities within XMS series.
- Connectivity of several additional models.
- Connection to first-generation model advisor.
- Publication of initial set of protocols.
- Improved CASC2D within WMS that simulates groundwater-surface water.
- Provide flags identifying when model executions are complete on remote machines, or to query status.
- Linkage to ATTACC and WCDS.

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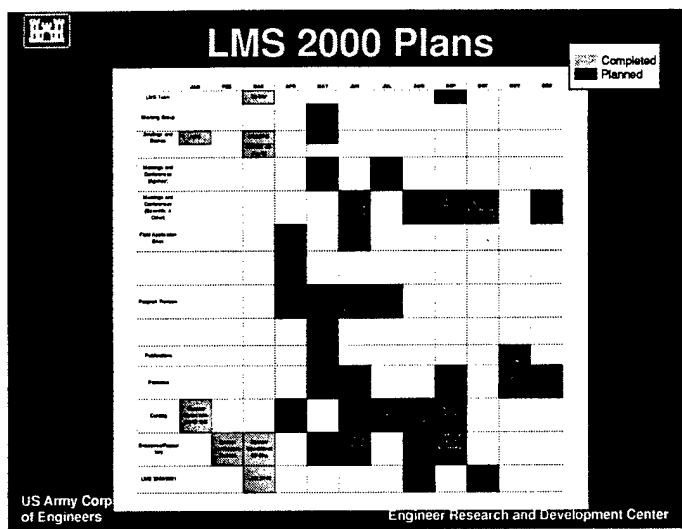
LMS2001 Development Pathway - continued

LMS2001

- Initial conceptual modeling environment.
- Improved training distribution modeling
- Initial decision support tools, including ability to archive model results, query them.
- Integration of several additional models.
- Complete link to OO-IDLAMS with feedback from its models to/from LMS hydrology codes.
- Ability to log into LMS data repository from non-local machine into LMS servers.
- Initial capability to manipulate key variables of calibrated/verified user model and execute.


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PRESENTATION: MCAGCC LMS Military Field Application Program Overview.

PRESENTER: Dick Gebhart.



MCAGCC/LMS Overview

LMS-IPR, Palm Springs, 13 April 2000

- Dick L. Gebhart, ERDC-CERL
- Partners
 - MCAGCC/USMC/SWDNFEC
 - Kip Otis-Diehl, Jeff Foisy, Dawn Lawson
 - USDA-ARS-WERU
 - Shepherd-Miller
 - Tierra Data Systems
 - USACE/Sacramento District
 - SERDP


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Background/History

- Field Application Site Selection Criteria
 - Interest from natural resources managers in integrating new capabilities and further developing science and technology partnerships
 - Sensitive and highly visible natural resources management problems
 - Importance of site and problems to mission
 - Support across all levels of the field application site and parent organization
 - Synergism with existing programs and efforts

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Background/History

- MCAGCC Selection Criteria
 - Keen interest in developing an ITAM program
 - Desert tortoise, wind erosion, vegetation establishment, and mission sustainability are management concerns unique to MCAGCC and other arid military installations
 - Excellent data sets with sophisticated GIS capabilities and personnel
 - Support across all levels of the field application site and parent organization; Commanding General, Installations & Logistics, NREA
 - Recently implemented LCTA program

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LMS Field Application Site-MCAGCC

LMS OBJECTIVE

Development of capabilities/systems/models for effective training land, habitat, natural resources, and ecosystem management in arid and semiarid regions

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LMS Field Application Site-MCAGCC

Natural Resources Problems/Concerns

Arid landscapes are particularly sensitive to training disturbances and have long recovery times

Disturbances from frequent and heavy training activities (CAX) result in:

- loss of vegetation cover and diversity
- soil disturbance and increased wind erosion
- loss of critical habitat (i.e. desert tortoise)
- invasion of non-native plant species
- decreased training realism

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LMS Field Application Site-MCAGCC

Natural Resources Problems/Concerns

Methods to characterize training capacity, design/adjust training use, and forecast future land conditions based on alternative training scenarios are needed to improve sustainability

Protocols for accessing, querying, and sharing GIS data among different users with different requirements are needed

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LMS Field Application Site-MCAGCC

SPECIFIC PROJECTS

Land Based Carrying Capacity

- Land Condition Trend Analysis (LCTA) assessment and protocol development
- Integration of LCTA data into modeling and simulation scenarios for land use compatibility and carrying capacity analysis
 - Ecological Dynamics Simulation Model (EDYS)
 - Training Use Distribution Model (TUDM)

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LMS Field Application Site-MCAGCC

SPECIFIC PROJECTS

Land Rehabilitation and Maintenance

Wind Erosion

- Identification of problem severity
- Identification of cultural/management practices to mitigate effects and severity of wind erosion problems
- Integration of wind erosion component into Army Training and Testing Area Carrying Capacity (ATTACC) model

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LMS Field Application Site-MCAGCC

SPECIFIC PROJECTS

GIS Enabling Technologies

Web-Based Map Dissemination

- Investigate interface between Data Acquisition Model (DAM) prototype and internal web browser
- Complete interface and develop Virtual Marine Corps Air Ground Combat Center (VMCAGCC)

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LMS Field Application Site-MCAGCC

RELATED PROJECTS

SERDP

Analysis and Assessment of Military and Non-Military Impacts on Biodiversity
Emerging and Contemporary Technologies in Remote Sensing for Ecosystem Assessment and Change Detection on Military Installations
Diagnostic Tools and Reclamation Technologies for Mitigating Impacts of DoD/DOE Activities in Arid Areas

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LMS Field Application Site-MCAGCC

Products From LMS Application

Development of computer based land management models and capabilities specific to arid and semiarid regions
Improved LCTA protocols and ability to effectively use LCTA data in EDYS, carrying capacity simulation, and wind erosion models
Improved GIS map dissemination capabilities

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LMS Field Application Site-MCAGCC

Tri-Service/DoD Conservation User Requirements Addressed by Application at MCAGCC

Land Capability and Characterization #3

Land based carrying capacity
Wind erosion
GIS enabling technologies

Land Rehabilitation #4

Wind erosion

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LMS Field Application Site-MCAGCC

Collaborators

Tierra Data Systems, Escondido, California

— Liz Kellogg

Sacramento District COE

— Bob Koenig

Mojave Desert Ecosystem Project

— Clarence Everly

Southwest Division, Naval Facilities Engineering

— Dawn Lawson

SERDP

— Dr. Robert Holst

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LMS Field Application Site-MCAGCC

Collaborators

USDA, ARS, Wind Erosion Research Unit

— Dr. Ed Skidmore

Shepherd Miller

— Dr. Terry McLendon

— Dr. Mike Childress

Desert Research Institute

— Dr. Dave Mouat

University of Nevada-Reno


— Dr. Paul Tueller

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PRESENTATION: MCAGCC Map Dissemination.


PRESENTER: Kelly Dilks.



MCAGCC Map Dissemination

- ERDC - CERL Kelly Dilks
- MCAGCC Kip Otis-Diehl


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Objective

- To increase the visibility and utilization of MCAGCC spatial data

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Context

- Project initiated by conversation between Mr. Goran and Mr. Otis-Diehl
- Installation focus, but applicability to other installations

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Final Product

- A functioning portion of the MCAGCC website based on ESRI Map Objects Internet Map Server
 - Printing Requests
 - Templates of Popular Products
 - Data Request Forms

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Project Schedule

- Project Scheduled for completion 30 June 00
- 13 March 00 Project Progress Visit

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Transition Planning

- Map Objects IMS software with associated code
- Upkeep is html and Java based
- GIS POC needed due to personnel transition since 13 March visit

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Impact on Installation Operations

- Increased Efficiency and Effectiveness of Geospatial Group
- Increased availability of geospatial products to all aspects of MCAGCC

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Conclusion


- 30 June 00 Completion
- Need to determine support requirements due to personnel turn over

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PRESENTATION: Wind Erosion Study at MCAGCC.


PRESENTER: Edward Skidmore.



Wind Erosion Study MCAGCC

- E. L. Skidmore, USDA-ARS-WERU
- Partner - Tierra Data Systems
- MCAGCC and others


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Objective

- Do the additional research as needed to adapt and verify the Wind Erosion Prediction System (WEPS) as a tool to aid the management of military training lands in desert environments.

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Sub objectives

- 1. Develop the procedures to populate the data base necessary to apply WEPS to conditions existing on MCAGCC and other desert training lands
- 2. Compare wind erosion measured at selected sites at 29 Palms MCAGCC to that predicted by WEPS.

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Sub objectives

- 3. Determine the effect of substrate on wind erosion at MCAGCC.
- 4. Compare the saltation activity as measured by the BSNE sediment traps to the PM-10 in the same vicinity.
- 5. Determine the number of sediment clusters needed to characterize a difference at the 5% level in desert environments.

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Other considerations

- 1. Compare the saltation activity, as measured with a device like the SENSIT, to the measured PM-10 in the same vicinity.
- 2. Compare the passive dust fallout with the measured PM-10 in the same vicinity.
- 3. Evaluate when dust becomes a safety and health issue.

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- This effort got initiated as a result of discussions among people from MCAGCC, Tierra Data Systems, CERL, ARS, and Naval Facilities Engineering Command
- The relationship to installation concerns are:

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Final Product

- A tool to aid the management of military training lands in desert environments relative to prediction and control of wind erosion.

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Integration

- This work relates to other wind erosion projects on agricultural lands and unpaved roads.
- Other Military bases include: Ft. Bliss, TX; and ??, Hawaii.

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Project Schedule

- Analyze soil samples collected by TDS at experimental site for primary size distribution, aggregate size distribution, moulded aggregate stability, wet aggregate stability.
- Analyze samples collected from dust samplers: mass, fit equations to mass-flux vs height data, integrate equations to determine mass-flux, analyze variability among sample clusters, determine size distribution with distance above ground, determine nutrients (pom, p, k)

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Project Schedule

- Complete research plan/scope of work.
- Visit MCAGCC and decide placement of sediment traps.
- Provide consultative services to TDS relative to service of sediment traps, collecting dust samples, etc.
- Supply additional sediment traps as needed.
- Provide consultative services to TDS ...

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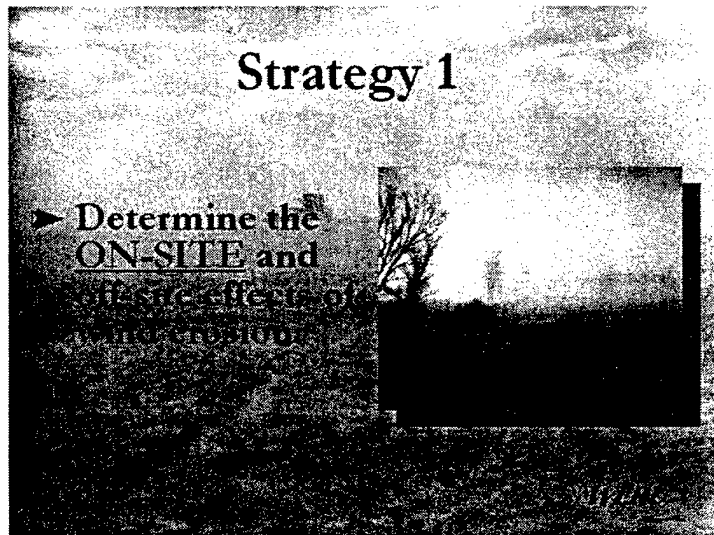
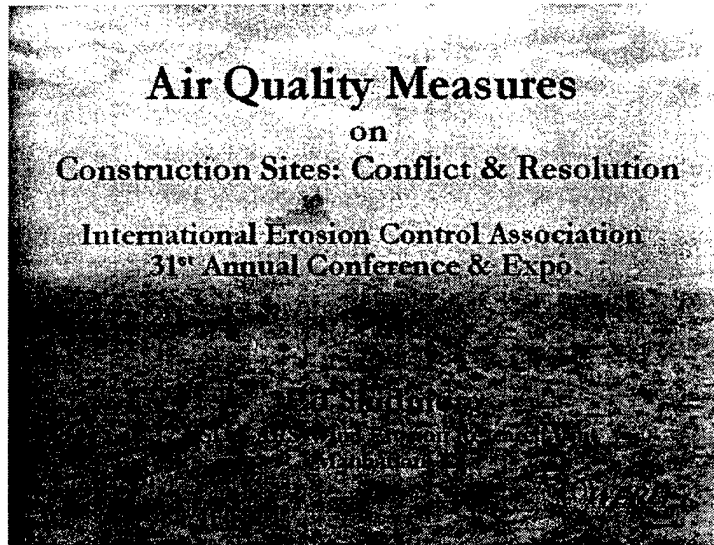


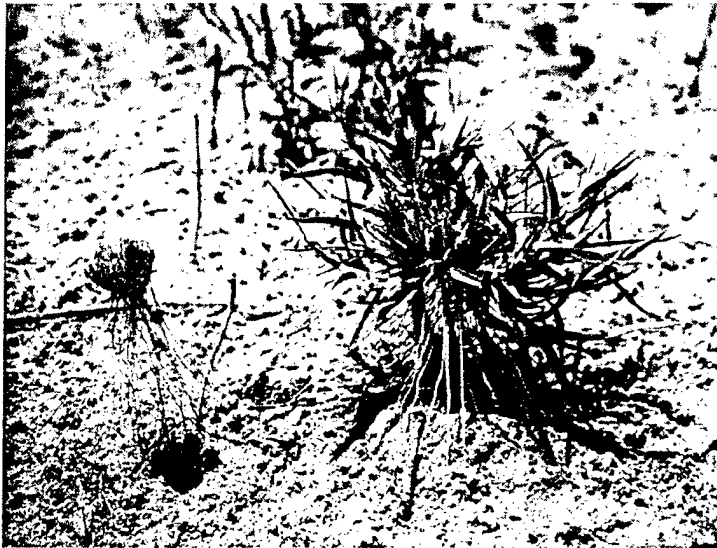
Project Schedule

- Obtain meteorological data from MCAGCC PM-10 sites and nearby weather stations.
- Regress sediment transport vs wind energy exceeding specified threshold.
- Obtain inputs necessary to run WEPS at location: surface roughness, vegetation characteristics, land treatment, ...
- Run WEPS and compare measured vs predicted sediment fluxes.

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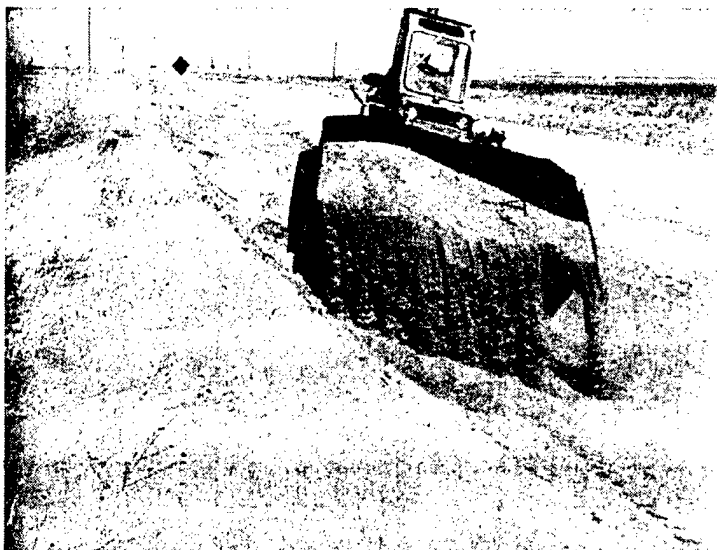
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Strategy 1 (Continue)

- Determine the on-site and off-site impacts of the proposed project.



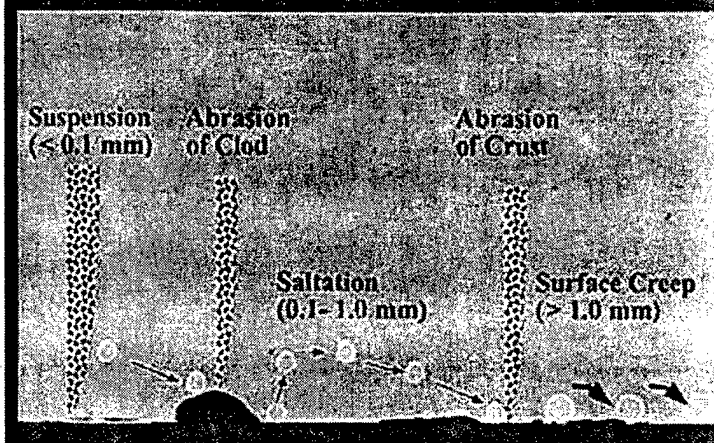


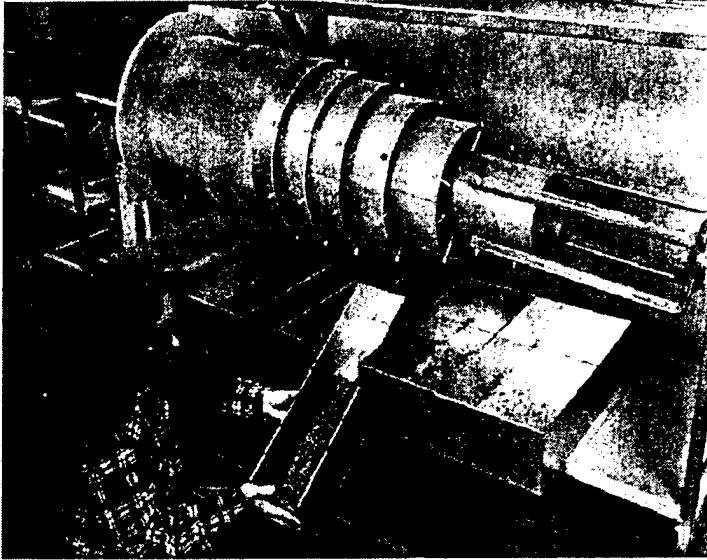
Strategy 2

- Increase understanding of wind erosion and related processes



Wind Erosion Processes





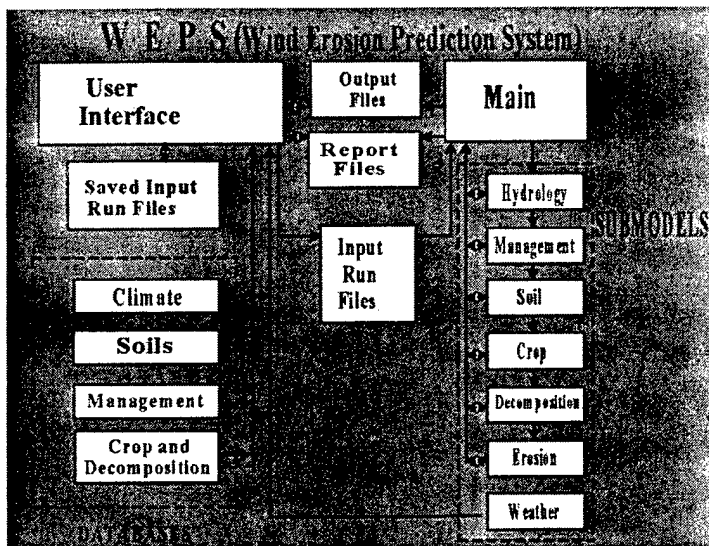
Strategy 3

- Predict wind erosion, fugitive dust and their

consequences

with the use of

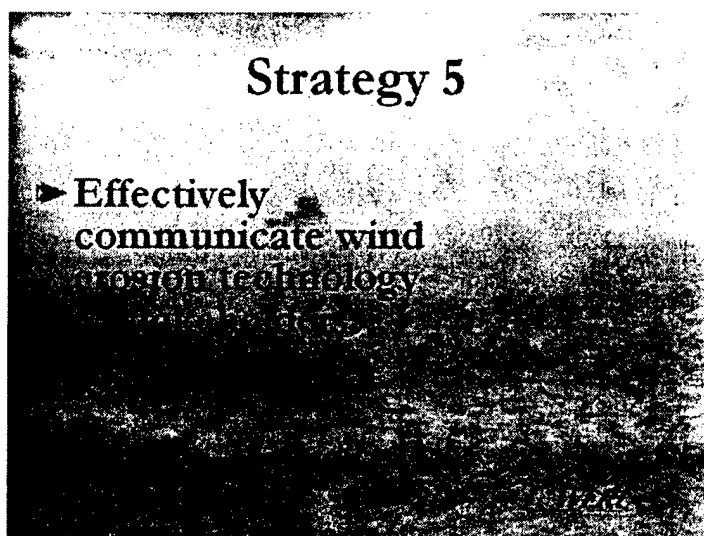
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Strategy 4

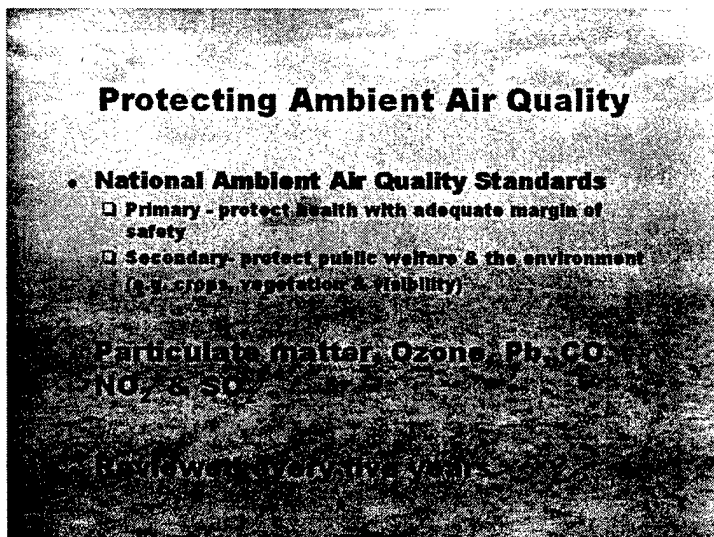
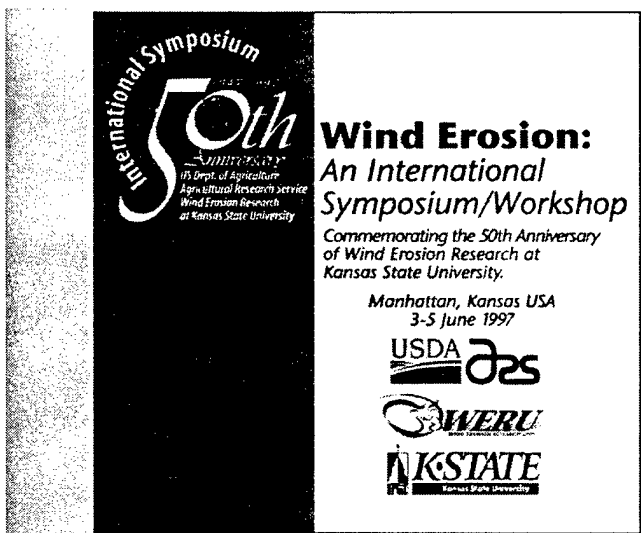
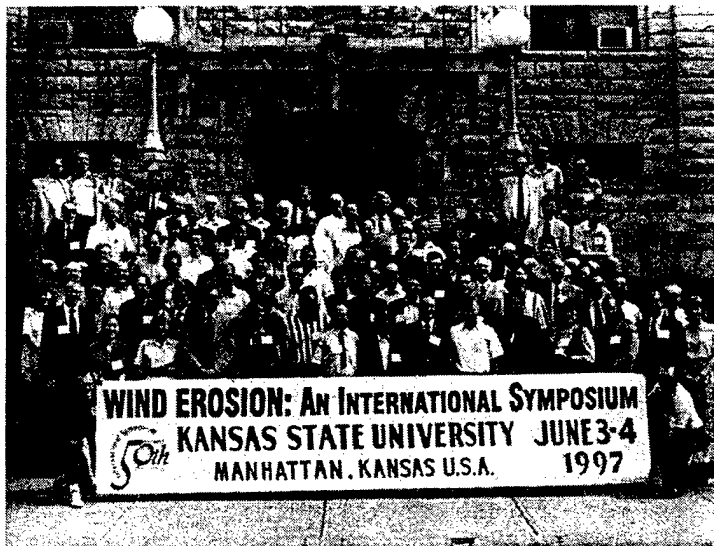
- Develop economically and environmentally viable practices, guidelines, and systems for controlling wind erosion and fugitive dust.





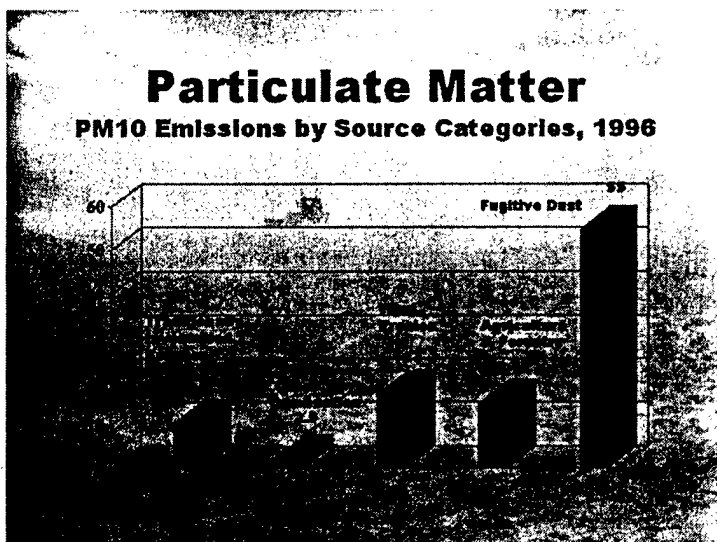
Strategy 5

- Effectively communicate wind erosion technology



AIR QUALITY MEASURES		
National Ambient Air Quality Standards (NAAQS)		
POLLUTANT	STANDARD VALUE	STANDARD TYPE
Carbon Monoxide (CO)		
8-hour Average	9.0 mg/m ³	Primary
1-hour Average	4.9 mg/m ³	Primary
Nitrogen Dioxide (NO₂)		
Annual Mean	150 ppb	Primary & Secondary
1-hour Average	400 ppb	Primary & Secondary
24-hour Average	170 ppb	Primary & Secondary

Particulate < 10 (PM-10)		
Annual Mean	50 µg/m ³	Primary & Secondary
24-hour Average	150 µg/m ³	Primary & Secondary
Particulate < 2.5 (PM-2.5)		
Annual Mean	15 µg/m ³	Primary & Secondary
24-hour Average	50 µg/m ³	Primary & Secondary



**FUGITIVE DUST PM-10 EMISSION
ESTIMATES FOR 1990 BY EPA. BARNARD,
CARLSON, STUART, 1992**

Category	Thousand Tons
Non-paved roads	15,515
Paved roads	7,977
Construction Activities	10,044
Wind Erosion	1,141
Agricultural Operations	5,808
Transport - Unpaved Roads	272
Burns	1,145

**Those Issues Most Related To
Construction Sites**

• Wind Erosion

Disturbed Lands

• Agricultural Operations

Transport - Unpaved Roads

Particulate Matter (PM₁₀) Trends

• Ambient Air Quality

- 1988-90 25% decrease

Emissions

- 1988-90 12% decrease

**USDA-ARS AIR QUALITY WORKSHOP
SACRAMENTO, CA 26-28 JAN 00**

Components of Air Quality

- Ozone
- Odors
- Primary Particulates
- Secondary Particulates - Ammonia

**ARS - AIR QUALITY WORKSHOP (CONT)
Primary Particulate Issues**

- Agricultural Burning Alternatives
- Wind Erosion
- Ammonia Emissions
- Agricultural Machinery
- Bio-Renewables

APPROACH

- Emission
- Transport
- Deposition
- Control
- Measurement
- Prediction

AIR QUALITY MEASURES ON CONSTRUCTION SITES

Conflict: Opposing action of incompatibles

Incompatibles:

1. EPA set Air Quality Standards

2. Activity on construction sites
produces air pollutants to
exceed standards

3. Solution: Research with incompatibles

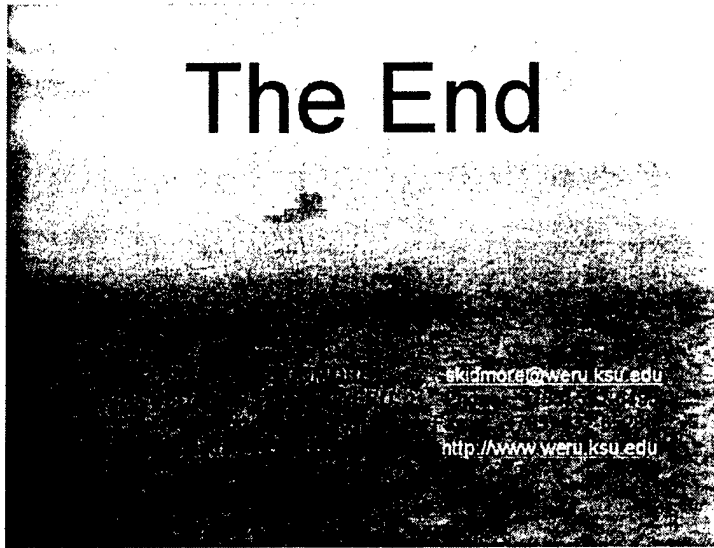
Scenario:

1. Qualify the effects of construction actions
2. Increase understanding of processes
3. Develop predictive capability
4. Develop appropriate control measures
5. Develop appropriate policy

PRESIDENTS PROPOSED BUDGET

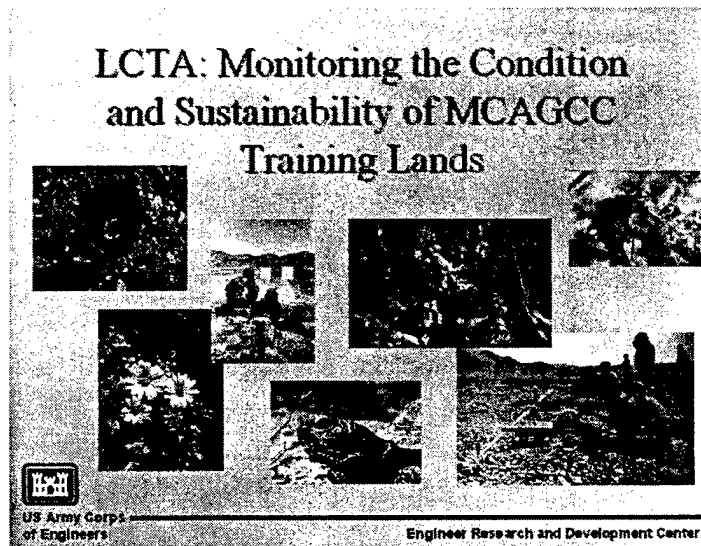
- Congressional action

If funding were available what research
would best help you resolve the conflict?



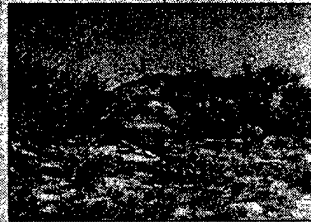
PRESENTATION: LCTA: Monitoring the Condition and Sustainability of MCAGCC Training Lands.

PRESENTER: Liz Kellogg.



Objectives

1. *Improve understanding of the link between training activities and the erosion status of training lands.*
2. *Develop LCTA's use as a conservation planning tool for the long-term sustainability of training lands.*



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Context

1. LCTA Program initiated 1997.
2. LCTA in the desert requires a different approach to assessing trend because of long recovery times.
3. Sustainability of training lands needs to be defined in the context of this specific ecosystem, in order to be an effective conservation planning tool.



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Approach



What's different about the desert?

- Recovery times are longer than the time scale for management.
- Extreme events drive environmental change more than average annual events.
- Resources are concentrated in shrub islands...water, nutrients, and diversity...and disturbance changes this.



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Approach



What's different about the desert (cont.)?

- Cover may increase with a low amount of disturbance, but still have structural and food web simplification.
- Soil surface condition and soil profile development affect water availability to plants...and disturbance changes this.

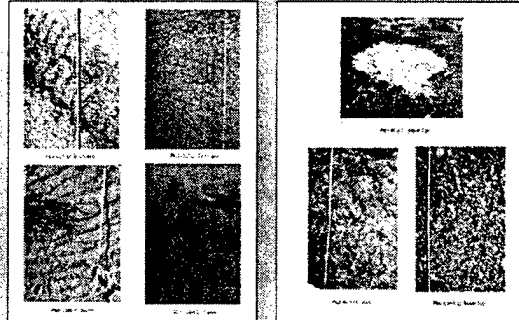


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Approach

Different soil surface conditions respond differently to training, and have different recovery pathways.

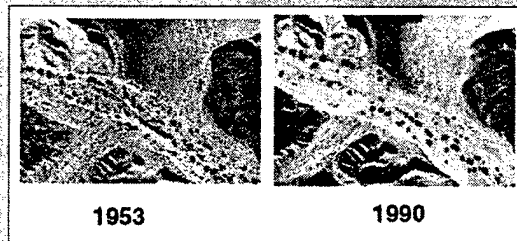


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Approach

- Build disturbance profiles.
- Develop explanations of differences in site condition and transitions to these states.



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Approach

- Long-term monitoring transects are placed along disturbance gradients, within 1 km of each other, in similar sites with respect to geology, landform, surface substrate and topographic position. This may be called "space-for-time substitution."
- Reference (habitat) vs. use comparisons.
- Trend over time.



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Approach

Select key markers of processes that lead to site health or degradation. The current ones:

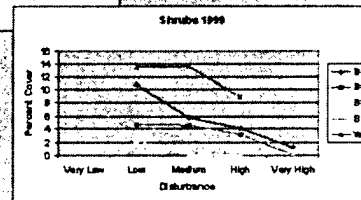
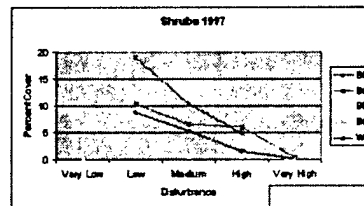
- ~ plant cover
- ~ species composition
- ~ species frequency and diversity
- ~ shrub density
- ~ rock / gravel cover
- ~ rock / gravel volume
- ~ disturbance (tracks, craters, excavations and their apparent age)
- ~ biological crust activity
- ~ soil texture



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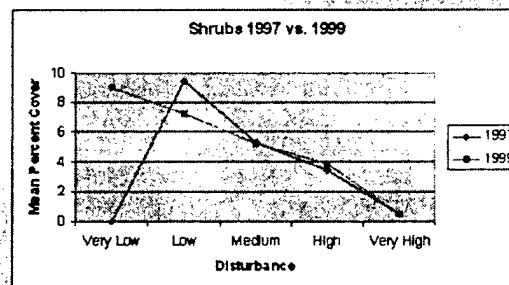
Approach



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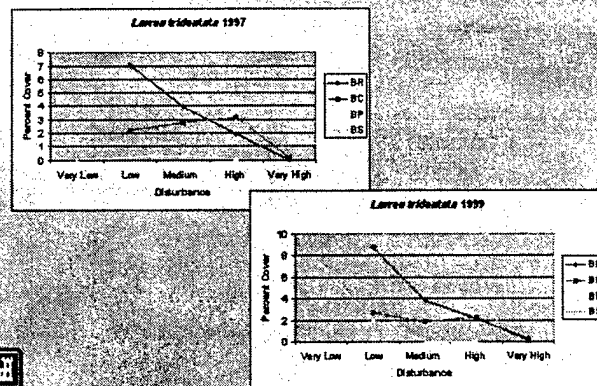
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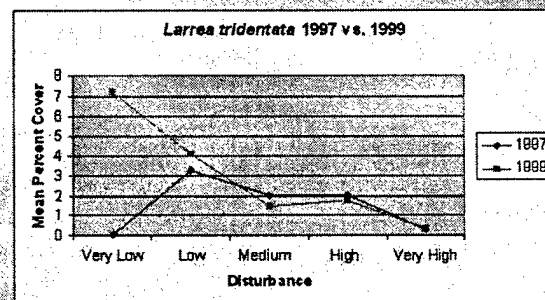
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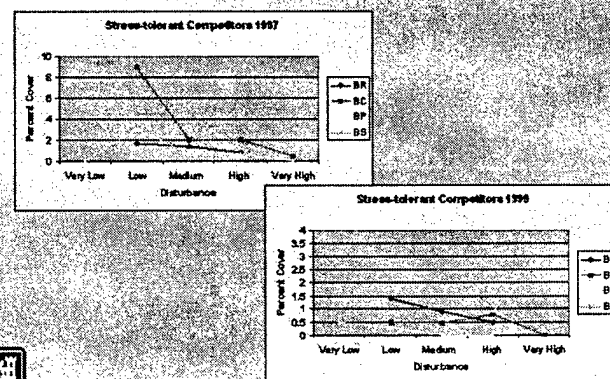
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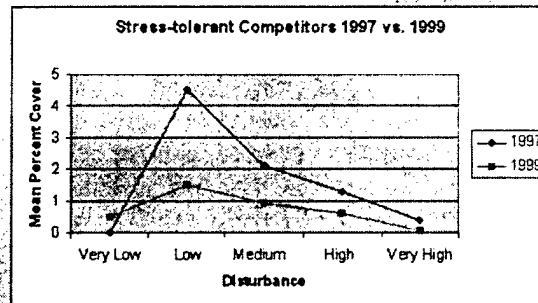
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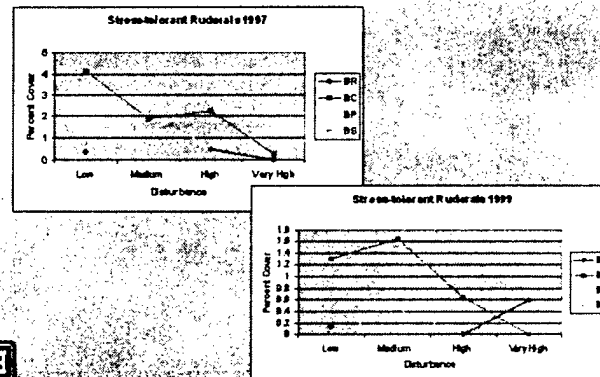
Approach



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Approach



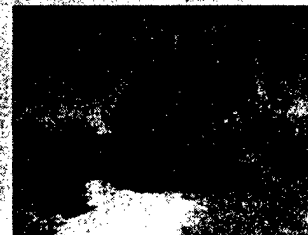
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Products

Additional measures to support erosion assessment:

- surface roughness
- shrub shape
- shrub density around dust collectors
- shrub optical density
- soil bulk density
- soil infiltration rate



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Integration

- Dust collection samplers located near moderately disturbed plots in a range of substrates (work with USDA-ARS WERU).
- Complements PM10/2.5 sampling program and located near those stations.
- Supports MCAGCC efforts to describe site condition and trends, to guide sustainability planning.
- Supports MCAGCC's efforts to determine how to extrapolate site data for Basewide planning.



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Project Schedule

- First sediment collection complete.
- Field work on plots begins this week.

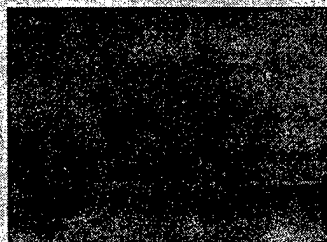


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Transition Planning

- Sediment collections sent to WERU.
- Field data synthesized and sent to WERU.

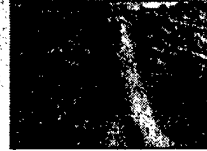


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Impact on Installation Operations

- Improved wind erosion prediction because of link to on-the-ground disturbance and link to other factors besides soil texture.
- Improved water erosion prediction due to data on infiltration, compaction.
- Improved set of variables for assessing effects of military training.



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Conclusion

- Project completion in approximately 12 months.
- Need to develop GIS-based predictive capabilities.

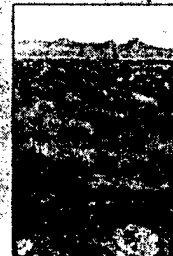


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Recommendations

- Develop link to NRCS ecosite mapping units and % cover of coarse fragments from Soil Survey.
- Separate compliance versus sustainability concerns.



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PRESENTATION: Emerging and Contemporary Technologies in Remote Sensing for Ecosystem Assessment and Change Detection on Military Reservations.

PRESENTER: Paul Tueller, Doug Ramsey.



Emerging and Contemporary Technologies in Remote Sensing for Ecosystem Assessment and Change Detection on Military Reservations (CS-1098)

Randall S. Karalus (Project Coordinator)
USACE Topographic Engineering Center

Paul T. Tueller, Ph.D. (Principal Investigator)
University of Nevada Reno

R. Douglas Ramsey, Ph.D. (Principal Investigator)
Utah State University

Mojave Desert (MCAGCC) LMS In-Progress Review
13 APR 2000



PERFORMERS

- Randall S. Karalus (Proj. Coordinator) USACE TEC
- Paul T. Tueller (PI), Ph.D. U. of Nevada, Reno
- R. Douglas Ramsey, Ph.D. Utah State U., Logan
- Thomas D. Frank, Ph.D. U. of Illinois, Urbana
- Scott A. Tweddle USACE CERL
- Robert Washington-Allen Oak Ridge National Lab
- Carolyn Hunsaker, Ph.D. USDA Forest Service
- Thomas G. Van Niel Utah State U., Logan
- Others:
 - UNR Adrienne Ereland (Graduate Assistant)
 - UIUC Tari Wenckebach (Research Ecologist)
 - USU Eli Podemskier, Todd Cayton, Larin Malahan (Graduate Assistants)
 - CERL Alan Anderson, Dr. David Price, William Jackson
 - TEC Rob Farther, Mike Campbell, Jeffrey Pehr



PERFORMERS (continued)

Camp Williams (ANG): Directorate of the Environment

Dr. John Crane (Environmental Director)
 Maj. Bob Dunton (Environmental Officer)
 Mr. Doug Johnson (LCIA Coordinator)
 Mr. Joel Godfrey (Fire Ecologist/Fuels Management)

Fort Bliss (Army): Directorate of the Environment

Dr. Keith Landreth (Chief, Conservation Division)
 Kevin von Finger (Senior NEPA Ecologist)
 Dallas Bash (GIS Manager)
 Brett Russell (Senior NEPA Ecologist)

Twentynine Palms (MCAGCC - USMC)

Paul "Kip" Otis-Diehl
 Valerie Prehoda
 Rhys Evans
 Jeff Foisy

3



TECHNICAL APPROACH

Ecotone and Disturbance Gradient Analysis

Investigators:

UNR, UIUC, CERL, TEC

Goals: Spatial/Spectral

Assess high resolution systems to identify the sensor attributes necessary to monitor changes in plant species composition along disturbance gradients and plant successional stages.

Calibration of scales to allow extrapolation over larger geographic regions.

Retrospective Analysis

Investigators:

ORNL, USU, TEC

Goals: Temporal/Spectral

Establish ecological history in relation to land use to describe how activities affect ecosystem and landscape response and recovery, i.e., resilience.

Identify the range of variation in the characteristics of disturbances associated with a landscape.

Determine the existence of thresholds in response and recovery to natural and DoD activities.

4



TECHNICAL OBJECTIVES

Overall Objective:

Develop a remote-sensing based protocol for use by land managers to monitor and assess the impacts of military training activities on their landscapes.

What is the 'Condition' and 'Trend' of selected military facilities in regards to remotely sensed indicators?

What type of vegetation/soil parameters, successional dynamics, and related processes are detectable by remote sensing at different spatial, temporal, and spectral scales.

Overall Approach:

Determine the temporal, spatial, and where possible, the spectral scales at which indicators of change relevant to land managers can be detected.

5



TECHNICAL OBJECTIVES

Stratify the landscape of individual military ranges using contemporary and emerging remote sensing technologies.

Identify the fundamental vegetation and soil attributes of military ranges as they relate to plant succession, carrying capacity, habitat management, and land resources.

Identify the spatial, spectral and temporal attributes of remote sensing systems necessary to identify ecotones.

Establish ecosystem response and recovery in relation to disturbance (land use) through retrospective studies with spatially-explicit spectral-based indices.

Develop methods for scaling through multi-resolution imagery.

6



TECHNICAL BACKGROUND

This research is designed to develop reliable remote sensing techniques to relate *ecological concepts* of:

- carrying capacity (EDYS → ATTACC → LMS),
- vegetation dynamics,
- species diversity
- critical thresholds,
- habitat fragmentation,
- ecosystem response and recovery,
- land degradation, and
- native plant community vigor

to *ecological endpoints*.

7



TECHNICAL BACKGROUND

(continued)

Ecological endpoints can be more specifically defined in terms of the following:

- Changes in plant species composition;
- Decrease in plant productivity;
- Reduction in soil quality;
- Accelerated soil erosion; and
- Changes in landcover and pattern that affect ecological function.

Spectral indicators derived from these endpoints measure the response to training activities on military installations.

8

FIELD DATA
Integrating field and image analysis

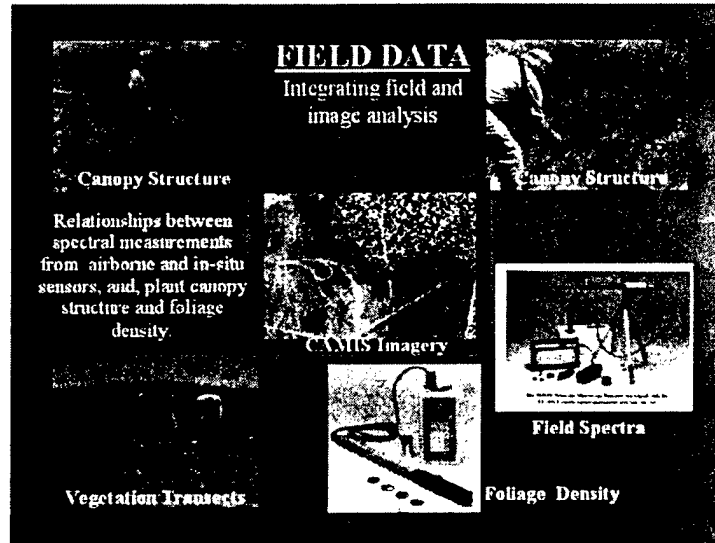
Canopy Structure
Relationships between spectral measurements from airborne and in-situ sensors, and plant canopy structure and foliage density.

CCMIS Imagery

Field Spectra

Vegetation Transects

Foliage Density



Woods Canyon, MCAGCC, California

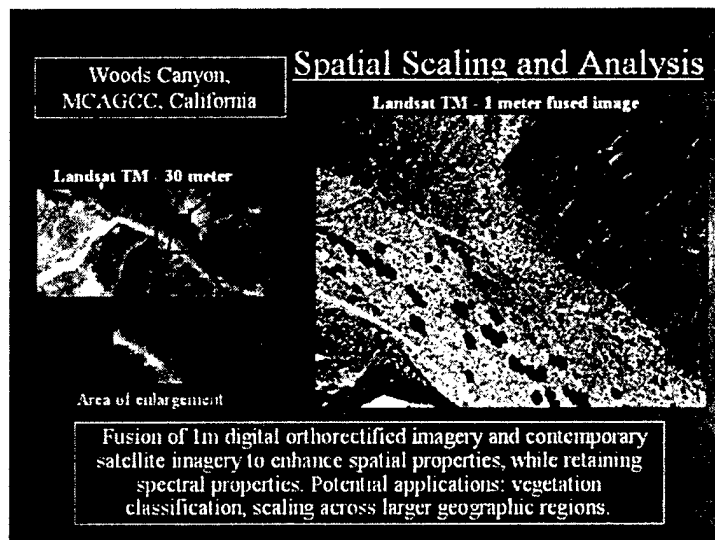
Spatial Scaling and Analysis

Landsat TM - 30 meter

Landsat TM - 1 meter fused image

Area of enlargement

Fusion of 1m digital orthorectified imagery and contemporary satellite imagery to enhance spatial properties, while retaining spectral properties. Potential applications: vegetation classification, scaling across larger geographic regions.




DELIVERABLES

Ecotone and Degradation Gradient Analysis

- ◆ Protocols for spatial change detection.
- ◆ Methods for scaling through high and low resolution data sets for change detection over large geographic extents.
- ◆ Remote sensing techniques and procedures, and sensor requirements, necessary to identify and monitor species composition, plant successional stages, and soil attributes on military ranges.
- ◆ Protocols for linking contemporary and emerging sensor data to ecological models.
- ◆ Vegetation maps for each study site.
- ◆ Data Base of contemporary/emerging high resolution imagery and ground data.
- ◆ Peer Reviewed Publications.
- ◆ Interim Report Contributions.

NOTE: Analysis procedures are to be developed using commercial-off-the-shelf software (e.g., ARCView, ERDAS Imagine) and available on CD ROM



DELIVERABLES (continued)

Retrospective Analysis

- ♦ Protocols for temporal change detection.
- ♦ Ecological Resilience/Behavior Models at critical thresholds of the ecosystem.
- ♦ Remote Sensing Techniques and Procedures necessary to identify and monitor ecosystem response and recovery on military ranges.
- ♦ Protocols for linking contemporary data to ecological models.
- ♦ Ecosystem Maps for each facility.
- ♦ Data base of contemporary imagery providing historical context.
- ♦ Enhanced Data Base of RFMSS, unit , and training information.
- ♦ Peer Reviewed Publications.
- ♦ Interim Report Contributions.

NOTE: Analysis procedures are to be developed using commercial-off-the-shelf software (e.g., ARCView, ERDAS Imagine) and available on CD ROM.

12



TRANSITION PLAN

- ♦ Spatial change detection will be demonstrated, validated, and documented both for improved input data to several ecological models and also for implementation at other installations at the completion of this effort.
- ♦ Temporal change detection and uncertainty analysis protocols will be demonstrated, validated, and documented for improving ecological understanding and modeling. Protocols will be applicable to other installations at the completion of this effort.
- ♦ Technology transfer will occur via scientific and technical literature, CD-ROM publication and distribution, and Internet sites prepared as a part of this study with specific information for each study location. See: www.gis.unl.edu/~serdp and www.gis.unl.edu/mojave/emerging.htm
- ♦ Protocols are being incorporated into widely used off-the-shelf software (e.g., ESRI ArcView GIS, ERDAS Imagine image processing software).

13

PRESENTATION: LCTA Collaboration and Land Use Carrying Capacity.

PRESENTER: David Price and Terry McLendon.

LCTA Collaboration and Land Use Carrying Capacity

- Presenters - David Price, Terry McLendon, Mike Childress
- Partners - Elizabeth & Jim Kellogg, Dawn Lawson
- Marine Corps Air Ground Combat Center - Twentynine Palms, CA
 - POC's - Paul 'Kip' Otis-Diehl, Jeff Foisy



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Objective

- Work with MCAGCC, TDS, and NAVFAC personnel to assess current LCTA protocol
- Team will determine improvements to LCTA based on MCAGCC goals and objectives
- Team will develop implementation plan
- SMI and CERL will use existing data to develop simulation model for carrying capacity (EDYS-TUDM)



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Context

- Initiation - LMS project team recommendation and formal memorandum of agreement between USACERL and MCAGCC
- Installation priorities - Collaboration on LCTA protocol and carrying capacity modeling, wind erosion modeling, and web-based map dissemination



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Final Product

- Product description - Dr. Terry McLendon, SMI
- Demonstration of working version - Dr. Mike Childress, SMI



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MCAGCC Twenty-Nine Palms EDYS Application Plant Species

Trees/Shrubs

burroweed
catclaw
cholla
creosotebush
desert willow
Joshua tree
mesquite
prickly pear
ratany
saltcedar
smoketree

Grasses

cheatgrass
fluffgrass
galleta
Indian ricegrass
Mediterranean
grass
red threeawn
sixweeks grama

Forbs

desert mallow
filaree
mare's tail
pepperweed
plantain
Russian thistle



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MCAGCC Twenty-Nine Palms EDYS Application

Ecological Stressors

Fire
Insect/rodent herbivory
Interspecific competition
Precipitation fluctuations
Soil erosion/deposition
Soil nitrogen availability

Management Scenarios

Bivouac/Staging
Foot traffic
Linear disturbances
Reseeding
Tracked vehicle traffic
Wheeled vehicle traffic



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MCAGCC Twenty-Nine Palms EDYS Application

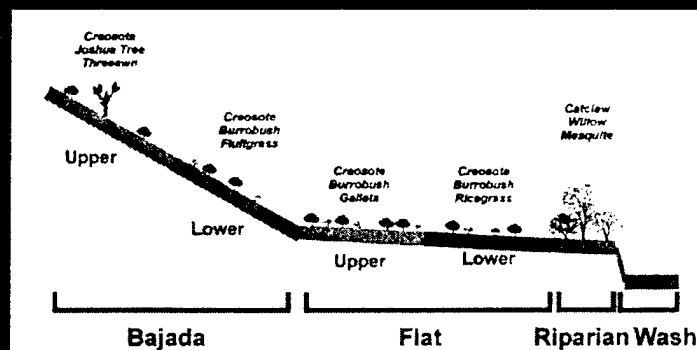
Community	Location	Impact
Creosotebush-yucca/treeawn	Upper bajada	Low
Creosotebush-cactus/cheatgrass	Upper bajada	High
Creosotebush-ratany/fluffgrass	Lower bajada	Low
Creosotebush-ratany/cheatgrass	Lower bajada	High
Creosotebush-burroweed/ galleta	Upper flat	Low
Creosotebush- burroweed/ Med grass	Upper flat	High
Creosotebush- burroweed/ ricegrass	Lower flat	Low
Creosotebush- burroweed/ Med grass	Lower flat	High
Catclaw-desert willow-mesquite	Riparian	Low
Catclaw-desert willow-saltcedar	Riparian	High



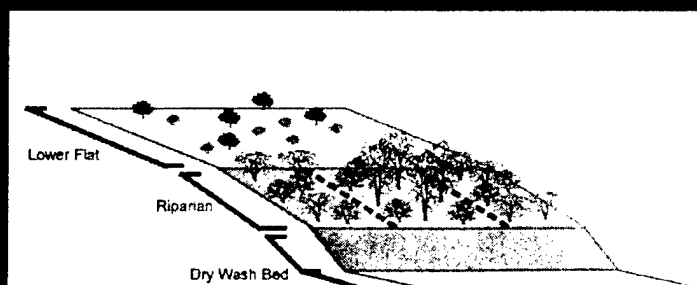
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Twenty-Nine Palms MCAGCC / Mojave Desert Community Zone



Twenty-Nine Palms MCAGCC / Mojave Desert Lower Flat, Riparian, and Wash Areas



MCAGCC Twenty-Nine Palms EDYS Application

End Point Variables

- Productivity of desert tortoise food plants
- Productivity of each plant community
- Relative composition of native plants
 - overall and by species
- Relative composition of non-native plants
 - overall and by species
- Spatial extent of native plant communities
- Soil erosion
 - topsoil loss and deposition
- Surface water export to and from dry wash



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Integration

- Dynamic link with the Training Use Distribution Model (TUDM) in progress
- Dynamic link with CASC2D model in progress
- Installation digital and tabular data, e.g., DEM, Vegetation, LCTA, Soils, TES/sensitive areas habitat
- Future link with Wind Erosion Models



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Project Schedule

Milestone	Status
• Initial coordination	complete
• LCTA execution plan	complete
• Carrying Capacity model plan	complete
• Contracts with SMI and TDS	complete
• Present working Carrying Capacity	3Q FY00
• Present LCTA recommendations	4Q FY00
• Dynamic link EDYS/TUDM	2Q FY01
• Final Carrying Capacity Model	3Q FY01



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Transition Planning

- What will be handed over?
 - Executable form of EDYS for simple landscape in designated TA - 3Q FY01
 - Workshop to train installation personnel in EDYS structure, data entry, re-parameterization, hands-on with various management scenarios - 3Q FY01
 - Recommendations for LCTA protocol and data analysis procedures - 4Q FY00



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Impact on Installation Operations

- Capability - Objectively project and evaluate the impacts of potential or perceived conflicting land uses and management strategies
- Value - Facilitates stakeholder participation rather than divisive land use planning and management



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Conclusion

- Case study completion - planned June 01
- Future needs - Implementation support and planning



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5 MCAGCC LMS Military Field Application FY00 IPR Summary of Comments and Responses

During the workshop, each participant was asked to provide comments on specific projects, general direction of MCAGCC military demonstration, and future direction and/or prioritization of future projects. This chapter summarizes the comments provided by the workshop participants. Table 1 lists each comment, who provided the comment, and the LMS response to the comment. Along with the response, the person responsible for addressing the issue is provided.

Table 1. Workshop participant comments/questions and responses.

No.	Commenter	Comment/Question	Response
1	ERDC/CERL	Who is the new POC to replace Jeff Foisy?	Answer: Lorrie Agnew (MCAGCC)
2	MCAGCC	Request for information and recommendations on non-exotic, non-invasive vegetative wind breaks.	Accessing VegSpec at http://plants.usda.gov/ will allow you to select the appropriate native species for wind barriers. Will provide species list to MCAGCC. (CERL/Skidmore)
3	MCAGCC	What type of dust collectors and saltation device are recommended?	Passive dust collectors are recommended and SENSIT is recommended for saltation readings. (Skidmore)
4	Skidmore	Need micronet data from Phil Chambers.	Request will be forwarded to Chambers. (MCAGCC)
5	Shepard/Miller	Asked for EDYS input from MCAGCC and other users.	Take out cheatgrass. (MCAGCC) Add red brome and burr sage to the model. (Fort Irwin)
6	MCAGCC	MCAGCC wants to be sure that they are not paying for ERDC/CERL LMS projects. There is concern about the possibility of funds being mixed on several LCTA projects.	The current projects funded by ERDC/CERL and MCAGCC are distinct and separate. No funds have been mixed on either SOW. (Kellogg)
7	MCAGCC	Data structure follows Tri-Service CADD/GISTEC, currently looking at directory structure with report and data capabilities.	Concur. (Dilks)
8	MCAGCC	Integrated multimedia is a concern for getting information to the user and getting that to the management level in a user-friendly way.	Concur. (Dilks)

No.	Commenter	Comment/Question	Response
9	MCAGCC	Construction of web-based map dissemination to use for UXO applications, using objects programmer.	Concur. Will look into applicability. (Dilks)
10	Fort Irwin	Request for TUDM information.	TUDM report will be sent out to Fort Irwin. (Goran)
11	Fort Irwin	What is the status of RWEQ?	Wind erosion advisory group is currently working on RWEQ. Will forward request to Alan Anderson. (Skidmore/Gebhart)
12	MDEP	More information is needed on data repository, when will this be available?	Will advise. (Dilks)
13	Navy	How are plant shapes accounted for in the wind erosion models?	Concur. Plant shape effects on wind erosion are currently being studied. (Skidmore)

Appendix A: MCAGCC LMS IPR Letter of Invitation and List of Invitees

CEERD-CN-C (70-1s)

03 March 2000

MEMORANDUM FOR SEE DISTRIBUTION

SUBJECT: FY00 In-Progress Review (IPR) for Mojave Desert (Twenty-nine Palms) Land Management System (LMS) Military Field Application Site, 13 April 2000, Palm Springs, California

1. The first IPR for the Mojave Desert Marine Corps Air Ground Combat Center (MCAGCC) LMS Military Field Application Site will be held at the Holiday Inn - Palm Mountain Resort, 155 South Belardo in Palm Springs, CA. This IPR is designed to provide participants with an opportunity to learn about and influence the projects underway or planned for the Mojave Desert region and MCAGCC related to LMS. We will also be discussing how MCAGCC and other interested installations will use the outcomes of these projects.

2. There will be an opportunity on Thursday for MCAGCC and other interested installation personnel to provide feedback on specific projects, relate information on the general direction of the MCAGCC military demo, and input to prioritize future LMS (and related) projects at MCAGCC. Other participating organizations will also have the opportunity to contribute their input.

3. For additional information on LMS, see the enclosed brochure and review the LMS website at <http://www.denix.osd.mil/LMS>.

4. A block of rooms has been reserved at the Holiday Inn - Palm Mountain Resort, 155 South Belardo. Rooms must be reserved by 13 March 2000 to ensure availability. Rooms are \$89.00 plus tax, to make your reservations contact (760) 325-1301. You must mention that you are taking part in the Twentynine Palms IPR meeting to receive this special rate. Further in-

formation regarding local restaurants and attractions can be found at <http://www.palmsprings.com>.

5. RSVP to Ms. Heidi Howard by Thursday, 06 April 2000 if you plan to attend this IPR. For questions concerning the IPR, please contact Ms. Heidi Howard at (217) 352-6511 ext. 7601, h-howard@cecer.army.mil. Ms. Howard is helping coordinate the IPR and can assist you with any issues.

Encl

WILLIAM D. GORAN
LMS Coordinator

CEERD-CN-C (70-1s)

SUBJECT: FY00 In-Progress Review (IPR) for Mojave Desert (Twenty-nine Palms) Land Management System (LMS) Military Field Application Site, 13 April 2000, Palm Springs, California

DISTRIBUTION:

Alan Anderson
John Barko
Pat Black
Mike Childress
Kelly Dilks
Clarence Everly
Jeff Foisy
Dick Gebhart
William Goran
Robert Holtz
Jeff Holland
Heidi Howard
Wayne Johnson
Bruce Jones
Liz Kellogg
Robert Koenigs
Richard Lawrence
Dawn Lawson
Ray Madden
Kim Majerous
Terry McLendon
Valerie Morrill
Dave Mouat
Jim Omans
Kip Otis-Diehl
David Price
Robert Riggins
Marilyn Ruiz
Ed Skidmore
Ruth Sparks
Scott Tweddale

CEERD-CN-C (70-1s)

SUBJECT: FY00 In-Progress Review (IPR) for Mojave Desert (Twentynine Palms) Land Management System (LMS) Military Field Application Site, 13 April 2000, Palm Springs, California

AGENDA

0800	IPR Opens at Holiday Inn Palm Mountain Resort
0815-0845	Overview LMS Introduction, Bill Goran
0845-0915	MCAGCC Introduction, Dick Gebhart
0915-1015	Web-based Map Dissemination, Kelly Dilks
1015-1030	Break
1030-1115	Wind Erosion, Ed Skidmore
1115-1200	Carrying Capacity, Dave Price
1200-1300	Lunch Break
1300-1330	LCTA/ITAM at MCAGCC, Liz Kellogg (tentative)
1330-1415	SERDP Remote Sensing, Scott Tweddale
1415-1500	SERDP Alternative Futures, Dave Mouat (tentative)
1500-1545	SERDP Arid Lands Restoration, Dick Gebhart
1545-1600	Break
1500-1600	Comment and Review
1600-1700	Plans for the Future

Appendix B: MCAGCC LMS IPR List of Attendees Information

MEMORANDUM FOR (LMS POC)

SUBJECT: FY00 In-Progress Review (IPR) Attendees List for Twenty-nine Palms Land Management System (LMS) Military Field Application Site, April 13, 2000, Palm Springs, California.

Lorrie Agnew
Mike Childress
Kelly Dilks
Clarence Everly
Jeff Foisy
Tom Frank
Dick Gebhart
William Goran
Heidi Howard
Liz Kellogg
Richard Lawrence
Dawn Lawson
Terry McLendon
Kip Otis-Diehl
Val Prehoda
David Price
Doug Ramsey
Ed Skidmore
Ruth Sparks
Paul Tueller
Scott Tweddale
Robert Washington-Allen

NAME	ORGANIZATION	ADDRESS	PHONE and EMAIL
Lorrie Agnew	MCAGCC	MCAGCC Box 788110 Attn: L. Agnew 29 Palms, CA 92278	(760) 830-7396 ext 244 agnewlr@29palms.usmc.mil
Mike Childress	Shepherd Miller Inc.	Shepherd Miller Inc. 3801 Automation Way, Suite 100 Fort Collins, CO 80525	(970) 223-9600 (970) 223-7171 mchildress@shepmill.com
Kelly Dilks	ERDC/CERL	ERDC/CERL PO Box 9005 Champaign, IL 61826	(217) 352-6511 k-dilks@cecer.army.mil
Clarence Everly	Mojave Desert Ecosystem Program	Mojave Desert Ecosystem Program 222 East Main Street Suite 216 Barstow, CA. 92311	(760) 255-8896 everlyc@mojavedata.gov
Jeff Foisy	Mojave Desert Ecosystem Program	Mojave Desert Ecosystem Program 222 East Main Street Suite 216 Barstow, CA. 92311	(760) 255-8895 foisyj@mojavedata.gov
Tom Frank	University of Illinois	University of Illinois 220 Davenport Urbana, IL 61801	(217) 333-7248 frank@gis.uiuc.edu
Dick Gebhart	ERDC/CERL	ERDC/CERL PO Box 9005 Champaign, IL 61826	(217) 352-6511 d-gebhart@cecer.army.mil
William Goran	ERDC/CERL	ERDC/CERL PO Box 9005 Champaign, IL 61826	(217) 352-6511 w-goran@cecer.army.mil
Heidi Howard	ERDC/CERL	ERDC/CERL PO Box 9005 Champaign, IL 61826	(217) 352-6511 h-howard@cecer.army.mil
Liz Kellogg	Tierra Data Systems	Tierra Data Systems 10110 West Lilac Escondido, CA 92026	(760) 749-2247 liz@tierradata.com
Richard Lawrence	ESRI	ESRI 380 New York Street Redlands, CA 92373-8100	(909) 793-2853 ext 1700 rlawrence@esri.com
Dawn Lawson	Naval Facilities Eng.	Commander SW Naval Facilities Eng. Com- mand (Dawn Lawson) 1220 Pacific Hwy. San Diego, CA 92132	(619) 532-3775 Law- sonDM@efdswnavfac.navy.mil

Terry McLendon	Shepherd Miller Inc.	Shepherd Miller Inc. 3801 Automation Way, Suite 100 Fort Collins, CO 80525	(970) 223-9600 (970) 223-7171 mchildress@shepmill.com
Kip Otis-Diehl	MCAGCC	MCAGCC Box 788110 Attn: P. Otis-Diehl NREA 29 Palms, CA 92278	(760) 830-7396 ext 241 otisdiehlpk@29palms.usmc.mil
Val Prehoda	MCAGCC	MCAGCC Box 788110 Attn: V. Prehoda 29 Palms, CA 92278	(760) 830-7396 ext 238 prehodav@29palms.usmc.mil
David Price	ERDC/WES	ERDC/WES 909 Halls Ferry Road Vicksburg, MS 39180	(601) 634-4874 d-price@wes.army.mil
Doug Ramsey	Utah State University	Director, Remote Sensing/GIS Lab 9635 Ordmann Hill, USU Logan UT, 84322-9635	(435) 797-3783 dougr@cnr.usu.edu
Ed Skidmore	USDA-ARS	Kansas State University 1007B Throckmorton Hall Manhattan KS, 66506	(785) 532-6726 skidmore@ksu.edu
Ruth Sparks	Fort Irwin	Commander NTC and Fort Irwin AFZJ-PT PO Box 105100 ATTN: ITAM Office (Sparks) Fort Irwin, CA 92310-5100	(760) 380-5903 sparksr@irwin.army.mil
Paul Tueller	UNR	Dept Environmental & Resource Science University of Nevada Reno 1000 Valley Road Reno, NV 89512	(775) 784-4053 ptt@equinox.unr.edu
Scott Tweddale	ERDC/CERL	ERDC/CERL PO Box 9005 Champaign, IL 61826	(217) 352-6511 s-tweddale@cecer.army.mil
Robert Wash- ton-Allen	Oakridge	ORNL P.O. Box 2008, M56407, Bldg 1507 Oak Ridge, TN 37831-6407	(865) 241-5159 obq@ornl.gov

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LMS IPR Attendees (20)

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5/00

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OMB No. 0704-0188

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1. REPORT DATE (DD-MM-YYYY) 11-2000		2. REPORT TYPE Final		3. DATES COVERED (From - To)	
4. TITLE AND SUBTITLE Marine Corps Air Ground Combat Center (MCAGCC) Land Management System (LMS) Military Field Application Site FY00 In-Progress Review				5a. CONTRACT NUMBER	
				5b. GRANT NUMBER	
				5c. PROGRAM ELEMENT NUMBER	
6. AUTHOR(S) Heidi Howard, Dick Gebhart, and William Goran				5d. PROJECT NUMBER 62720A917	
				5e. TASK NUMBER	
				5f. WORK UNIT NUMBER	
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) U.S. Army Construction Engineering Research Laboratory (CERL) P.O. Box 9005 Champaign, IL 61826-9005				8. PERFORMING ORGANIZATION REPORT NUMBER ERDC/CERL TR-00-35	
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES) U.S. Army Corps of Engineers 20 Massachusetts Ave. N.W. Washington, DC 20314-1000				10. SPONSOR/MONITOR'S ACRONYM(S) CERD-ZA	
				11. SPONSOR/MONITOR'S REPORT NUMBER(S)	
12. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited.					
13. SUPPLEMENTARY NOTES Copies are available from the National Technical Information Service, 5285 Port Royal Road, Springfield, VA 22161.					
14. ABSTRACT <p>The Land Management System (LMS) is an initiative of the U.S. Army Corps of Engineers (USACE) Engineer Research and Development Center (ERDC) focused on improving landscape analysis and landscape management capabilities in several of the Corps of Engineers major mission areas.</p> <p>The purpose of LMS is to provide relevant science, tools, and information to land and water resource managers and decisionmakers with the goal of enhancing their ability to understand and communicate past, current, and potential impacts of management actions on land and water resources.</p> <p>In 1999, the Marine Corps Air Ground Combat Center (MCAGCC) at Twentynine Palms, CA, was officially designated as a field application site. Field Application Site In-Progress Reviews (IPRs) are designed to ensure that the stages of evaluation, modification, and documentation are fulfilled. The first IPR workshop was held 13 April 2000. The objectives of this IPR were to provide a forum where personnel involved with specific MCAGCC LMS projects could discuss the progress of each effort, identify the relationships between projects, and solicit input from potential users of the resulting products. Results of the IPR are documented in this report to ensure project improvements and adjustments occur and to assist with the next IPR.</p>					
15. SUBJECT TERMS Land Management Systems (LMS), Marine Corps Air Ground Combat Center (MCAGCC), military land management, in-progress review (IPR)					
16. SECURITY CLASSIFICATION OF:			17. LIMITATION OF ABSTRACT SAR	18. NUMBER OF PAGES 84	19a. NAME OF RESPONSIBLE PERSON Dick Gebhart
a. REPORT Unclassified	b. ABSTRACT Unclassified	c. THIS PAGE Unclassified			19b. TELEPHONE NUMBER (include area code) (217) 352-6511, X-6391

Standard Form 298 (Rev. 8-98)
Prescribed by ANSI Std. Z39.18